



SEQUENCE LISTING

<110> DeAngelis, Paul
Jing, Wei

<120> TARGETED GLYCOSAMINOGLYCAN POLYMERS BY POLYMER GRAFTING AND
METHODS OF MAKING AND USING SAME

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Lys Lys Leu Asn Asn Ile Ile Glu Tyr Asn Lys Asn Ile Phe Val Ile
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 aaagtattta atgaaattgg tttttttaac tgcacaacca aagcatcgga tgatgaattt 780
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1851

<210> 6
<211> 615
<212> PRT
<213> Pasteurella multocida

<400> 6

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Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr
35 40 45

Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn
50 55 60

Lys Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser
65 70 75 80

Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser
85 90 95

Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile
100 105 110

Asn Ser Leu Leu Leu Gln Thr Tyr Asn Leu Glu Val Ile Val Val Asp
115 120 125

Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala Asn
130 135 140

Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly Thr
145 150 155 160

Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile Ile
165 170 175

Phe Phe Gln Ser Asp Asp Val Cys His His Glu Arg Ile Glu Arg Cys
180 185 190

Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg Cys Ala
195 200 205

Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val Asn Asp

210	215	220
Asn Lys Tyr Lys Leu Gly 225	Leu Ile Thr Leu Gly 230	Val Tyr Arg Lys Val 235 240
Phe Asn Glu Ile Gly 245	Phe Phe Asn Cys Thr 250	Thr Lys Ala Ser Asp Asp 255
Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg Ile Asn 260	265	270
Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp Ser Leu 275	280	285
Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys Gln Lys 290	295	300
Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys Ile His 305	310	315 320
Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe Pro Arg 325	330	335
Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu Ser Asn 340	345	350
Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser Arg Ile 355	360	365
Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys Asp His 370	375	380
Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe Ile Lys 385	390	395 400
Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys Asn Glu 405	410	415
Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu Ile Lys 420	425	430
Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile Arg Tyr 435	440	445
Pro Ala Asp Tyr Thr Asn Thr Met Ile Lys Lys Ile Asn Lys Tyr Asn 450	455	460
Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser Arg Val		

465 470 475 480
 Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln Lys Pro
 485 490 495
 Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr Val Ala
 500 505 510
 Phe Arg Val Ser Ile Phe Asn Lys Phe Ser Leu Ser Asp Phe Glu His
 515 520 525
 Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys Asn Asn
 530 535 540
 Ile Leu Gln Val Cys Ile Ser Arg Pro Ser Asn Trp Leu Thr Glu Asp
 545 550 555 560
 Asn Lys Asn Thr Glu Thr Leu Phe His Glu Phe Gln Asn Arg Asp Glu
 565 570 575
 Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr Ser Ser
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 Cys Leu Ser Phe Tyr Asn Glu
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<210> 7
 <211> 1940
 <212> DNA
 <213> *Pasteurella multocida*

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 ttcctgtacc taatacattg accgctttgt ctttttccag aggtttatag aagctatata 360
 ccagtctatc cgccgaaaaa tatttggtca ttctacttgg aaagagaatg ccgtgtaaac 420
 caataaccgc tttatcatcg tattcattca gcttcttgat catcgtattg atgtaatcgc 480
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 actcttccag taaaatgaat ttgccattat ctctaattga gttatcttta tctttgcaat 600

gaacaacggt tgctttatta cctaaatfff ttatgaagtc agggatttct acatagccat 660
 caagataaat atgaaaatga tcacattgat ttttttagtat gccgataata cgtcgttaatt 720
 gcgctatttct tgagggaata gaacaaatat tgatataaac aggaatctta ggattggaca 780
 acttactcat ttcttgtggt actggtaagg catcgtaaat acgagggaat tgaaaaagat 840
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 gtctggtatc agacattttc tgtattatgt tatgattgtc tatccattca accatatcag 960
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 ctctgacttt gcttggtgta ttcgctattc tcgaggcaat ttcaaataga ttatccgagc 1440
 tatcatcatc tacaataata atttctatgt ttttatatgt ttgtaacaat aatgaattaa 1500
 tagaagcttc gataaattgc gctgtattgt gagatgtcat gataaactg actaatggat 1560
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 gagaaataat gtctttgttt aaagttgttt ttagactatc aattttattt tgaaagggtg 1860
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 ctttttttct cttcatttca 1940

<210> 8
 <211> 651
 <212> PRT
 <213> Pasteurella multocida

<400> 8

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Pro Gln His Glu Lys Glu Asn Glu Leu Asn Thr Phe Gln Asn Lys Ile
20 25 30

Asp Ser Leu Lys Thr Thr Leu Asn Lys Asp Ile Ile Ser Gln Gln Thr
Page 17

35					40					45					
Leu	Leu 50	Ala	Lys	Gln	Asp	Ser 55	Lys	His	Pro	Leu	Ser 60	Ala	Ser	Leu	Glu
Asn 65	Glu	Asn	Lys	Leu 70	Leu	Leu	Lys	Gln	Leu	Gln 75	Leu	Val	Leu	Gln	Glu 80
Phe	Glu	Lys	Ile	Tyr 85	Thr	Tyr	Asn	Gln	Ala 90	Leu	Glu	Ala	Lys	Leu 95	Glu
Lys	Asp	Lys	Gln 100	Thr	Thr	Ser	Ile	Thr 105	Asp	Leu	Tyr	Asn	Glu 110	Val	Ala
Lys	Ser	Asp 115	Leu	Gly	Leu	Val	Lys 120	Glu	Thr	Asn	Ser	Val 125	Asn	Pro	Leu
Val	Ser 130	Ile	Ile	Met	Thr	Ser 135	His	Asn	Thr	Ala	Gln 140	Phe	Ile	Glu	Ala
Ser 145	Ile	Asn	Ser	Leu 150	Leu	Leu	Gln	Thr	Tyr	Lys 155	Asn	Ile	Glu	Ile	Ile 160
Ile	Val	Asp	Asp	Asp 165	Ser	Ser	Asp	Asn	Thr 170	Phe	Glu	Ile	Ala	Ser 175	Arg
Ile	Ala	Asn	Thr 180	Thr	Ser	Lys	Val	Arg 185	Val	Phe	Arg	Leu	Asn 190	Ser	Asn
Leu	Gly	Thr 195	Tyr	Phe	Ala	Lys	Asn 200	Thr	Gly	Ile	Leu	Lys 205	Ser	Lys	Gly
Asp	Ile 210	Ile	Phe	Phe	Gln	Asp 215	Ser	Asp	Asp	Val	Cys 220	His	His	Glu	Arg
Ile 225	Glu	Arg	Cys	Val	Asn 230	Ile	Leu	Leu	Ala	Asn 235	Lys	Glu	Thr	Ile	Ala 240
Val	Arg	Cys	Ala	Tyr 245	Ser	Arg	Leu	Ala	Pro 250	Glu	Thr	Gln	His	Ile 255	Ile
Lys	Val	Asn	Asn 260	Met	Asp	Tyr	Arg	Leu 265	Gly	Phe	Ile	Thr	Leu 270	Gly	Met
His	Arg	Lys 275	Val	Phe	Gln	Glu	Ile 280	Gly	Phe	Phe	Asn	Cys 285	Thr	Thr	Lys
Gly	Ser	Asp	Asp	Glu	Phe	Phe	His	Arg	Ile	Ala	Lys	Tyr	Tyr	Gly	Lys

290	295	300
Glu Lys Ile Lys Asn Leu Leu Leu Pro Leu Tyr Tyr Asn Thr Met Arg 305 310 315 320		
Glu Asn Ser Leu Phe Thr Asp Met Val Glu Trp Ile Asp Asn His Asn 325 330 335		
Ile Ile Gln Lys Met Ser Asp Thr Arg Gln His Tyr Ala Thr Leu Phe 340 345 350		
Gln Ala Met His Asn Glu Thr Ala Ser His Asp Phe Lys Asn Leu Phe 355 360 365		
Gln Phe Pro Arg Ile Tyr Asp Ala Leu Pro Val Pro Gln Glu Met Ser 370 375 380		
Lys Leu Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile 385 390 395 400		
Pro Ser Arg Ile Ala Gln Leu Arg Arg Ile Ile Gly Ile Leu Lys Asn 405 410 415		
Gln Cys Asp His Phe His Ile Tyr Leu Asp Gly Tyr Val Glu Ile Pro 420 425 430		
Asp Phe Ile Lys Asn Leu Gly Asn Lys Ala Thr Val Val His Cys Lys 435 440 445		
Asp Lys Asp Asn Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu 450 455 460		
Glu Leu Ile Glu Lys Asn Gln Asp Gly Tyr Tyr Ile Thr Cys Asp Asp 465 470 475 480		
Asp Ile Ile Tyr Pro Ser Asp Tyr Ile Asn Thr Met Ile Lys Lys Leu 485 490 495		
Asn Glu Tyr Asp Asp Lys Ala Val Ile Gly Leu His Gly Ile Leu Phe 500 505 510		
Pro Ser Arg Met Thr Lys Tyr Phe Ser Ala Asp Arg Leu Val Tyr Ser 515 520 525		
Phe Tyr Lys Pro Leu Glu Lys Asp Lys Ala Val Asn Val Leu Gly Thr 530 535 540		
Gly Thr Val Ser Phe Arg Val Ser Leu Phe Asn Gln Phe Ser Leu Ser		

545 550 555 560
 Asp Phe Thr His Ser Gly Met Ala Asp Ile Tyr Phe Ser Leu Leu Cys
 565 570 575
 Lys Lys Asn Asn Ile Leu Gln Ile Cys Ile Ser Arg Pro Ala Asn Trp
 580 585 590
 Leu Thr Glu Asp Asn Arg Asp Ser Glu Thr Leu Tyr His Gln Tyr Arg
 595 600 605
 Asp Asn Asp Glu Gln Gln Thr Gln Leu Ile Met Glu Asn Gly Pro Trp
 610 615 620
 Gly Tyr Ser Ser Ile Tyr Pro Leu Val Lys Asn His Pro Lys Phe Thr
 625 630 635 640
 Asp Leu Ile Pro Cys Leu Pro Phe Tyr Phe Leu
 645 650

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 <211> 703
 <212> PRT
 <213> Pasteurella multocida

<400> 9

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 Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg
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 Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala
 35 40 45
 His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
 50 55 60
 Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
 65 70 75 80
 Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
 85 90 95
 Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu
 100 105 110
 Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val
 115 120 125

Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys
130 135 140

Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu
145 150 155 160

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
180 185 190

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly
210 215 220

Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr
225 230 235 240

Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp
245 250 255

Val His Ser Tyr Val Ala Glu Leu Leu Glu Asp Asp Asp Leu Thr Ile
260 265 270

Ile Gly Pro Arg Lys Tyr Ile Asp Thr Gln His Ile Asp Pro Lys Asp
275 280 285

Phe Leu Asn Asn Ala Ser Leu Leu Glu Ser Leu Pro Glu Val Lys Thr
290 295 300

Asn Asn Ser Val Ala Ala Lys Gly Glu Gly Thr Val Ser Leu Asp Trp
305 310 315 320

Arg Leu Glu Gln Phe Glu Lys Thr Glu Asn Leu Arg Leu Ser Asp Ser
325 330 335

Pro Phe Arg Phe Phe Ala Ala Gly Asn Val Ala Phe Ala Lys Lys Trp
340 345 350

Leu Asn Lys Ser Gly Phe Phe Asp Glu Glu Phe Asn His Trp Gly Gly
355 360 365

Glu Asp Val Glu Phe Gly Tyr Arg Leu Phe Arg Tyr Gly Ser Phe Phe
370 375 380

Lys Thr Ile Asp Gly Ile Met Ala Tyr His Gln Glu Pro Pro Gly Lys
385 390 395 400

Glu Asn Glu Thr Asp Arg Glu Ala Gly Lys Asn Ile Thr Leu Asp Ile
405 410 415

Met Arg Glu Lys Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu
420 425 430

Asp Ser His Ile Asn Arg Val Pro Leu Val Ser Ile Tyr Ile Pro Ala
435 440 445

Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn
450 455 460

Gln Thr Val Val Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr
465 470 475 480

Asp Asn Thr Leu Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg
485 490 495

Val Arg Ile Met Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn
500 505 510

Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser
515 520 525

Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe
530 535 540

Leu Lys Asp Lys Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val
545 550 555 560

Asn Pro Asp Gly Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe
565 570 575

Ser Arg Glu Lys Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met
580 585 590

Phe Thr Ile Arg Ala Trp His Leu Thr Asp Gly Phe Asn Glu Lys Ile
595 600 605

Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly
610 615 620

Lys Phe Lys His Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly
625 630 635 640

Asp Asn Thr Ser Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe
645 650 655

Val Val Val Asn Gln Ser Leu Asn Arg Gln Gly Ile Thr Tyr Tyr Asn
660 665 670

Tyr Asp Glu Phe Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn
675 680 685

Lys Thr Ala Glu Tyr Gln Glu Glu Ile Asp Ile Leu Lys Asp Ile
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<211> 1953
<212> DNA
<213> Pasteurella multocida

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gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
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 <213> *Pasteurella multocida*

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tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt	1620
ttaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgctc	1680
aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa	1740
ctcacaacgg ctatgattgc tcaccacttt agaattgttca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatgtt cctcaaaactc	1860
agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatgg	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 12
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 12	
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aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc	120
aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca	360
aaagattttc ccaaagatct ggtttttagcg cttttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctct	480

tctattatcg	ttacaacatt	caatcgacca	gcaattttat	cgattacatt	agcctgttta	540
gtaaaccaaa	aaacacatta	cccgtttgaa	gttatcgtga	cagataatgg	tagtcaggaa	600
gatctatcac	cgatcattcg	ccaatatgaa	aataaattgg	atattcgcta	cgtcagacaa	660
aaagataacg	gttttcaagc	cagtgccgct	cggaatatgg	gattacgctt	agcaaaatat	720
gactttattg	gcttactcga	ctgtgatatg	gcgccaaatc	cattatgggt	tcattcttat	780
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gaaaatgaaa	ccgatcgtga	agcgggaaaa	aatattacgc	tcgatattat	gagagaaaag	1260
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ttagtttcaa	tttatatccc	agcttataac	tgtgcaaact	atattcaacg	ttgcgtagat	1380
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gataacacat	caattaagaa	acttggcatt	caaaagaaaa	accattttgt	tgtagtcaat	1980
cagtcattaa	atagacaagg	cataacttat	tataattatg	acgaatttga	tgatttagat	2040
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aaagatattt	aa					2112

<210> 13
 <211> 1614
 <212> DNA
 <213> *Pasteurella multocida*

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caacgttgcg tagatagtc actgaatcag actggtgttg atctcgaggt ttgtatttgt	120
aacgatgggt caacagataa taccttagaa gtgatcaata agctttatgg taataatcct	180
agggtacgca tcatgtctaa accaaatggc ggaatagcct cagcatcaaa tgcagccgtt	240
tcttttgcta aaggttatta cattgggcag ttagattcag atgattatct tgagcctgat	300
gcagttgaac tgtgtttaaa agaattttta aaagataaaa cgctagcttg tgtttatacc	360
actaatagaa acgtcaatcc ggatggtagc ttaatcgcta atgggttaca ttggccagaa	420
ttttcacgag aaaaactcac aacggctatg attgctcacc actttagaat gttcacgatt	480
agagcttggc atttaactga tggattcaat gaaaaaattg aaaatgccgt agactatgac	540
atgttcctca aactcagtga agttggaaaa tttaaacatc ttaataaaat ctgctataac	600
cgtgtattac atgggtgata cacatcaatt aagaaacttg gcattcaaaa gaaaaacat	660
tttggttag tcaatcagtc attaaataga caaggcataa cttattataa ttatgacgaa	720
tttgatgatt tagatgaaag tagaaagtat attttcaata aaaccgctga atatcaagaa	780
gagattgata tcttaaaaga tattaaaatc atccagaata aagatgccaa aatcgagtc	840
agtatttttt atcccaatac attaaacggc ttagtgaaaa aactaaacaa tattattgaa	900
tataataaaa atatattcgt tattgttcta catgttgata agaatcatct tacaccagat	960
atcaaaaaag aaatactagc cttctatcat aaacatcaag tgaatatattt actaaataat	1020
gatattctcat attacacgag taatagatta ataaaaactg aggcgcattt aagtaatatt	1080
aataaattaa gtcagttaaa tctaaattgt gaatacatca tttttgataa tcatgacagc	1140
ctattcgta aaaaatgacag ctatgcttat atgaaaaaat atgatgtcgg catgaatttc	1200
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attaaaactt attttaatga caatgactta aaaagtatga atgtgaaagg ggcacacaa	1320
ggatgttta tgacgtatgc gctagcgcag gagcttctga cgattattaa agaagtcac	1380
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tttgacattt taatcttaga aaagaaaacc ggccatgtat ttaataaaac atcgaccctg	1500
acttatatgc cttgggaacg aaaattacaa tggacaaatg aacaaattga aagtgcaaaa	1560
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<210> 14
 <211> 966
 <212> DNA
 <213> *Pasteurella multocida*

<400> 14	
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caacgttgcg tagatagtc actgaatcag actggtgttg atctcgaggt ttgtatttgt	120

aacgatggtt caacagataa taccttagaa gtgatcaata agctttatgg taataatcct	180
agggtacgca tcatgtctaa accaaatggc ggaatagcct cagcatcaaa tgcagccgtt	240
tcttttgcta aaggttatta cattgggcag ttagattcag atgattatct tgagcctgat	300
gcagttgaac tgtgttttaa agaattttta aaagataaaa cgctagcttg tgtttatacc	360
actaatagaa acgtcaatcc ggatggtagc ttaatcgcta atgggttacia ttggccagaa	420
ttttcacgag aaaaactcac aacggctatg attgctcacc actttagaat gttcacgatt	480
agagcttggc atttaactga tggattcaat gaaaaaattg aaaatgccgt agactatgac	540
atgttcctca aactcagtga agttggaaaa tttaaacatc ttaataaaat ctgctataac	600
cgtgtattac atgggtgataa cacatcaatt aagaaacttg gcattcaaaa gaaaaacat	660
tttgtttag tagaatcagtc attaaataga caaggcataa cttattataa ttatgacgaa	720
tttgatgatt tagatgaaag tagaaagtat attttcaata aaaccgctga atatcaagaa	780
gagattgata tcttaaaaga tattaaaatc atccagaata aagatgccaa aatcgagtc	840
agtatttttt atcccaatac attaaacggc ttagtgaaaa aactaaacaa tattattgaa	900
tataataaaa atatattcgt tattgttcta catgttgata agaatcatct tacaccagat	960
atctaa	966

<210> 15
 <211> 1821
 <212> DNA
 <213> *Pasteurella multocida*

<400> 15	
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gttatcgtga cagatgatgg tagtcaggaa gatctatcac cgatcattcg ccaatatgaa	180
aataaattgg atattcgcta cgtcagacaa aaagataacg gttttcaagc cagtgccgct	240
cggaatatgg gattacgctt agcaaaatat gactttattg gcttactcga ctgtgatatg	300
gcgccaatc cattatgggt tcattcttat gttgcagagc tattagaaga tgatgattta	360
acaatcattg gtccaagaaa atacatcgat acacaacata ttgacccaaa agacttctta	420
aataacgcga gtttgcttga atcattacca gaagtgaaaa ccaataatag tgttgccgca	480
aaaggggaag gaacagtttc tctggattgg cgcttagaac aattcgaaaa aacagaaaat	540
ctccgcttat ccgattcgcc tttccgtttt tttgcggcgg gtaatgttgc tttcgctaaa	600
aatggctaa ataaatccgg tttctttgat gaggaattta atcactgggg tggagaagat	660
gtggaatttg gatatcgctt attccgttac ggtagtttct ttaaaactat tgatggcatt	720
atggcctacc atcaagagcc accaggtaaa gaaaatgaaa ccgatcgtga agcgggaaaa	780
aatattacgc tcgatattat gagagaaaag gtcccttata tctatagaaa acttttacca	840

atagaagatt cgcatatcaa tagagtacct ttagtttcaa tttatatccc agcttataac	900
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gaggtttgta tttgtaacga tggttcaaca gataatacct tagaagtgat caataagctt	1020
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tcaaatgcag ccgtttcttt tgctaaagggt tattacattg ggcagttaga ttcagatgat	1140
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gcttggtgtt ataccactaa tagaaacgtc aatccggatg gtagcttaat cgctaattggt	1260
tacaattggc cagaattttc acgagaaaaa ctcacaacgg ctatgattgc tcaccacttt	1320
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aaaatctgct ataaccgtgt attacatggg gataacacat caattaagaa acttggcatt	1500
caaaagaaaa accattttgt tgtagtcaat cagtcattaa atagacaagg cataacttat	1560
tataattatg acgaatttga tgatttagat gaaagtagaa agtatatttt caataaaacc	1620
gctgaatatc aagaagagat tgatatctta aaagatatta aaatcatcca gaataaagat	1680
gccaaaatcg cagtcagtat tttttatccc aatacattaa acggcttagt gaaaaaacta	1740
aacaatatta ttgaatataa taaaaatata ttcgttattg ttctacatgt tgataagaat	1800
catcttacac cagatatcta a	1821

<210> 16
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 16	
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aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcgtagat ccgtagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca	360
aaagattttc ccaaagatct ggtttttagcg cttttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgaagg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat	720
gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat	780
gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat	840
acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca	900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt	1020
tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat	1080
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gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
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agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 17
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 17	
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aatgcaaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaa	180
aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt	240

tccaacgtaa	aaaaattagt	actttctgac	tcggaaaaaa	acacgttaaa	aaataaatgg	300
aaattgctca	ctgagaagaa	atctgaaaat	gcggaggtaa	gagcggtcgc	ccttgtagca	360
aaagattttc	ccaaagatct	ggtttttagcg	cctttacctg	atcatgttaa	tgattttaca	420
tggtacaaaa	agcgaaagaa	aagacttggc	ataaaacctg	aacatcaaca	tgttggtctt	480
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agtgaagttg	gaaaatttaa	acatcttaat	aaaatctgct	ataaccgtgt	attacatggg	1920
gataacacat	caattaagaa	acttggcatt	caaagaaaaa	accattttgt	tgtagtcaat	1980
cagtcattaa	atagacaagg	cataacttat	tataattatg	acgaatttga	tgatttagat	2040
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aaagatattt	aa					2112

<210> 18
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 18
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 aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat 180
 aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt 240
 tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
 aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca 360
 aaagattttc ccaagatctt ggtttttagcg cttttacctg atcatgttaa tgattttaca 420
 tggtagaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt 480
 tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
 gttaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa 600
 gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
 aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat 720
 gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat 780
 gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat 840
 acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca 900
 gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg 960
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 tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat 1080
 gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac 1140
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 gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag 1260
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 <213> Pasteurella multocida

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 <212> DNA
 <213> *Pasteurella multocida*

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Lys Glu

<210> 23
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<210> 24
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<220>
 <223> primer Pm21

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<210> 25
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 <212> PRT
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<400> 25

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Lys Glu Phe

<210> 26
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 <212> DNA
 <213> Pasteurella multocida

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<210> 28
 <211> 1902
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 <211> 1830
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 <213> *Pasteurella multocida*

<400> 29						
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catgttaatg	attttacatg	gtacaaaaag	cgaaagaaaa	gacttggcat	aaaacctgaa	180
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attacattag	cctgtttagt	aaaccaaaaa	acacattacc	cgtttgaagt	tatcgtgaca	300
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gatattatga	gagaaaaggt	cccttatatc	tatagaaaac	ttttaccaat	agaagattcg	1020
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cctaggggtac	gcatcatgtc	taaaccaa	ggcggaatag	cctcagcatc	aaatgcagcc	1260
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gacatgttcc tcaaactcag tgaagttgga aaattttaaac atcttaataa aatctgctat	1620
aaccgtgtat tacatggtga taacacatca attaagaaac ttggcattca aaagaaaaac	1680
cattttgttg tagtcaatca gtcattaaat agacaaggca taacttatta taattatgac	1740
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gaagagattg atatcttaaa agatatttaa	1830

<210> 30
 <211> 1764
 <212> DNA
 <213> *Pasteurella multocida*

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catgttggtc tttctattat cgttacaaca ttcaatcgac cagcaatttt atcgattaca	180
ttagcctgtt tagtaaacca aaaaacacat taccgtttg aagttatcgt gacagatgat	240
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tacgtcagac aaaaagataa cggttttcaa gccagtgccg ctcggaatat gggattacgc	360
ttagcaaaat atgactttat tggcttactc gactgtgata tggcgccaaa tccattatgg	420
gttcattctt atgttgcaga gctattagaa gatgatgatt taacaatcat tggccaaga	480
aaatacatcg atacacaaca tattgacca aaagacttct taaataacgc gagtttgctt	540
gaatcattac cagaagtga aaccaataat agtggtgccg caaaagggga aggaacagtt	600
tctctggatt ggcgcttaga acaattcgaa aaaacagaaa atctccgctt atccgattcg	660
cctttccggt ttttgcggc gggtaatgtt gctttcgcta aaaaatggct aaataaatcc	720
ggtttctttg atgaggaatt taatcactgg ggtggagaag atgtggaatt tggatatcgc	780
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cgttgcgtag atagtgcact gaatcagact gttgttgatc tcgaggtttg tatttgtaac	1080
gatggttcaa cagataatac cttagaagtg atcaataagc tttatggtaa taatcctagg	1140

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gttgaactgt	gtttaaaaga	atTTTTTaaa	gataaaacgc	tagcttgtgt	ttataccact	1320
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gcttggcatt	taactgatgg	attcaatgaa	aaaattgaaa	atgccgtaga	ctatgacatg	1500
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gtattacatg	gtgataacac	atcaattaag	aaacttggca	ttcaaaagaa	aaaccatttt	1620
gttgtagtca	atcagtcatt	aaatagacaa	ggcataactt	attataatta	tgacgaattt	1680
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<210> 31
 <211> 2007
 <212> DNA
 <213> *Pasteurella multocida*

<400> 31	
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aatgcaaag	aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat 180
aaagaagaaa	aagtcaatgt ttgcatagat ccgttagata ttgcaacaca actgttactt 240
tccaacgtaa	aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
aaattgctca	ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca 360
aaagattttc	caaagatctt ggttttagcg cttttacctg atcatgttaa tgattttaca 420
tggtacaaaa	agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt 480
tctattatcg	ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
gtaaaccaa	aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa 600
gatctatcac	cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
aaagataacg	gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat 720
gactttattg	gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat 780
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gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
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tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt	1560
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agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt	1920
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cagtcattaa atagacaagg catataa	2007

<210> 32
 <211> 2061
 <212> DNA
 <213> *Pasteurella multocida*

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aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcatagat ccgtagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca	360
aaagattttc ccaaagatct ggttttagcg cttttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctct	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660
aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat	720

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gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
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aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa	1740
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agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggg	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
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gaaagtagaa agtatattta a	2061

<210> 33
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 33	
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aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca	360

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gtaaaccaa aaacacatta cccgtttgaa gttatcgta cagatgatgg tagtcaggaa	600
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gactttattg gcttactcga atgtgatatg gcgccaaatc cattatgggt tcattcttat	780
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gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
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cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
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aaagatattt aa	2112

<210> 34
<211> 2112

<212> DNA
<213> *Pasteurella multocida*

<400> 34
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actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc	1860
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gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
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aaagatattt aa	2112

<210> 35
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

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aaagaagaaa aagtcaatgt ttgcatagt ccgttagata ttgcaacaca actgttactt	240
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gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660
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ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatgtt cctcaaactc	1860
agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatgg	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 42
 <211> 2112
 <212> DNA
 <213> Pasteurella multocida

<400> 42	
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aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc	120

aaatgcaaag	aaaaactctc	agcacatcct	tctgttaatt	cagcacatct	ttctgtaa	180
aaagaagaaa	aagtcaatgt	ttgcgatagt	ccgttagata	ttgcaacaca	actgttactt	240
tccaacgtaa	aaaaattagt	actttctgac	tcggaaaaaa	acacgttaaa	aaataaatgg	300
aaattgctca	ctgagaagaa	atctgaaaat	gcggaggtaa	gagcggtcgc	ccttgtacca	360
aaagattttc	ccaaagatct	ggtttttagcg	cctttacctg	atcatgttaa	tgattttaca	420
tggtacaaaa	agcgaaagaa	aagacttggc	ataaaacctg	aacatcaaca	tgttggctct	480
tctattatcg	ttacaacatt	caatcgacca	gcaattttat	cgattacatt	agcctgttta	540
gtaaaccaa	aaacacatta	cccgtttgaa	gttatcgtga	cagatgatgg	tagtcaggaa	600
gatctatcac	cgatcattcg	ccaatatgaa	aataaattgg	atattcgcta	cgtcagacaa	660
aaagataacg	gttttcaagc	cagtgccgct	cggaatatgg	gattacgctt	agcaaaatat	720
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gttgacagagc	tattagaaga	tgatgattta	acaatcattg	gtccaagaaa	atacatcgat	840
acacaacata	ttgacccaaa	agacttctta	aataacgcga	gtttgcttga	atcattacca	900
gaagtgaaaa	ccaataatag	tgttgccgca	aaaggggaag	gaacagtttc	tctggattgg	960
cgcttagaac	aattcgaaaa	aacagaaaat	ctccgcttat	ccgattcgcc	tttccgtttt	1020
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gaaaatgaaa	ccgatcgtga	agcgggaaaa	aatattacgc	tcgatattat	gagagaaaag	1260
gtcccttata	tctatagaaa	acttttacca	atagaagatt	cgcatatcaa	tagagtacct	1320
ttagtttcaa	tttatatccc	agcttataac	tgtgcaaact	atattcaacg	ttgcgtagat	1380
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gataatacct	tagaagtgat	caataagctt	tatggtaata	atcctagggt	acgcatcatg	1500
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agtgaagttg	gaaaatttaa	acatcttaat	aaaatctgct	ataaccgtgt	attacatggt	1920
gataacacat	caattaagaa	acttggcatt	caaaagaaaa	accattttgt	tgtagtcaat	1980
cagtcattaa	atagacaagg	cataacttat	tataattatg	acgaatttga	tgatttagat	2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatatattt aa	2112

<210> 43
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 43	
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aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa agtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtagca	360
aaagattttc ccaagatctt ggttttagcg cttttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660
aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat	720
gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat	780
gttgtagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat	840
acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca	900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt	1020
tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat	1080
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ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa	1200
gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct	1320
ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat	1380
agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca	1440
gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg	1500
tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt	1560
tattacattg ggcagttaga ttcaaatgat tatcttgagc ctgatgcagt tgaactgtgt	1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc	1680
aatccggatg gtagcttaat cgctaattggc tacaattggc cagaattttc acgagaaaaa	1740
ctcacacggt ctatgattgc tcaccacttt agaattgttca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaaactc	1860
agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatatatt aa	2112

<210> 44
 <211> 2112
 <212> DNA
 <213> Pasteurella multocida

<400> 44	
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aaattattttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc	120
aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca	360
aaagattttc ccaaagatct ggttttagcg cttttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctct	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660
aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat	720
gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat	780
gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat	840
acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca	900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt	1020
tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat	1080
gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac	1140

ggtagtttct	ttaaaactat	tgatggcatt	atggcctacc	atcaagagcc	accaggtaaa	1200
gaaaatgaaa	ccgatcgtga	agcgggaaaa	aatattacgc	tcgatattat	gagagaaaag	1260
gtcccttata	tctatagaaa	acttttacca	atagaagatt	cgcatatcaa	tagagtacct	1320
ttagtttcaa	tttatatccc	agcttataac	tgtgcaaact	atattcaacg	ttgcgtagat	1380
agtgcactga	atcagactgt	tgttgatctc	gaggtttgta	tttgtaacga	tggttcaaca	1440
gataatacct	tagaagtgat	caataagctt	tatggtaata	atcctagggt	acgcatcatg	1500
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ttaaaagaat	ttttaaaaga	taaaacgcta	gcttggtgtt	ataccactaa	tagaaacgct	1680
aatccggatg	gtagcttaat	cgctaattgt	tacaattggc	cagaattttc	acgagaaaaa	1740
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agtgaagttg	gaaaatttaa	acatcttaat	aaaatctgct	ataaccgtgt	attacatggt	1920
gataacacat	caattaagaa	acttggcatt	caaaagaaaa	accattttgt	tgtagtcaat	1980
cagtcattaa	atagacaagg	cataacttat	tataattatg	acgaatttga	tgatttagat	2040
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aaagatatatt	aa					2112

<210> 45
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 45	
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aatgcaaag	aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat 180
aaagaagaaa	aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt 240
tccaacgtaa	aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
aaattgctca	ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca 360
aaagattttc	ccaaagatct ggttttagcg cctttacctg atcatgttaa tgattttaca 420
tggtaaaaa	agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctct 480
tctattatcg	ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
gtaaacaaa	aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa 600
gatctatcac	cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
aaagataacg	gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat 720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat	780
gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat	840
acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca	900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt	1020
tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat	1080
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ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa	1200
gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct	1320
ttagtttcaa ttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat	1380
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tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt	1560
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ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc	1680
aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa	1740
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agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatgg	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 46
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 46	
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aaatgcaaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt	240

tccaacgtaa	aaaaattagt	actttctgac	tcggaaaaaa	acacgttaaa	aaataaatgg	300
aaattgctca	ctgagaagaa	atctgaaaat	gcgagggtaa	gagcggtcgc	ccttgtagca	360
aaagattttc	ccaaagatct	ggtttttagcg	cctttacctg	atcatgttaa	tgattttaca	420
tggtacaaaa	agcgaaagaa	aagacttggc	ataaaacctg	aacatcaaca	tgttgggtctt	480
tctattatcg	ttacaacatt	caatcgacca	gcaattttat	cgattacatt	agcctgttta	540
gtaaaccaa	aaacacatta	cccgtttgaa	gttatcgtga	cagatgatgg	tagtcaggaa	600
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aaagataacg	gttttcaagc	cagtgccgct	cggaatatgg	gattacgctt	agcaaaatat	720
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gttgtagagc	tattagaaga	tgatgattta	acaatcattg	gtccaagaaa	atacatcgat	840
acacaacata	ttgacccaaa	agacttctta	aataacgcga	gtttgcttga	atcattacca	900
gaagtgaaaa	ccaataatag	tgttgccgca	aaaggggaag	gaacagtttc	tctggattgg	960
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agtgaagttg	gaaaatttaa	acatcttaat	aaaatctgct	ataaccgtgt	attacatggg	1920
gataacacat	caattaagaa	acttggcatt	caaaagaaaa	accattttgt	tgtagtcaat	1980
cagtcattaa	atagacaagg	cataacttat	tataattatg	acgaatttga	tgatttagat	2040
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aaagatattt	aa					2112

<210> 47
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 47
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 aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat 180
 aaagaagaaa aagtcaatgt ttgcatagat ccgttagata ttgcaacaca actgttactt 240
 tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
 aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggctgc cttgtacca 360
 aaagattttc ccaaagatct ggtttttagcg cttttacctg atcatgttaa tgattttaca 420
 tggtagaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctct 480
 tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
 gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa 600
 gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
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 gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat 780
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 ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc 1680
 aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa 1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatgtt cctcaaactc	1860
agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggg	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 48
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 48	
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aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc	120
aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcatagat ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca	360
aaagattttc ccaagatct ggtttttagcg cttttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctct	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660
aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat	720
gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat	780
gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat	840
acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca	900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt	1020
tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat	1080
gaggaattta atcactgggg tggagaagaa gtggaatttg gatatcgctt attccgttac	1140
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gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct	1320
ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat	1380
agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca	1440
gataatacct tagaagtgtat caataagctt tatggtaata atcctagggg acgcatcatg	1500
tctaaaccaa atggcggaat agcctcagca tcaaattgcag ccgtttcttt tgctaaaggt	1560
tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt	1620
ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgct	1680
aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa	1740
ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatgtt cctcaaactc	1860
agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatgg	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 49
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 49	
atgaatacat tatcacaagc aataaaaagca tataacagca atgactatca attagcactc	60
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aatgcaaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaaat gcggaggtaa gagcggtcgc cttgtacca	360
aaagattttc ccaaagatct ggttttagcg cttttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtaaacaaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660
aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat	720
gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat	780
gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat	840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca	900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt	1020
tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat	1080
gaggaattta atcactgggg tggagaaaat gtggaatttg gatatcgctt attccgttac	1140
ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa	1200
gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct	1320
ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat	1380
agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca	1440
gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg	1500
tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagggt	1560
tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt	1620
ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc	1680
aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa	1740
ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatgtt cctcaaactc	1860
agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 50
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 50	
atgaatacat tatcacaagc aataaaaagca tataacagca atgactatca attagcactc	60
aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc	120
aatgcaaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca	360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtcctt	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa	660
aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat	720
gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat	780
gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat	840
acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca	900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg	960
cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt	1020
tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat	1080
gaggaattta atcactgggg tggagaaaaa gtggaatttg gatatcgctt attccgttac	1140
ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa	1200
gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct	1320
ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat	1380
agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca	1440
gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg	1500
tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt	1560
tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt	1620
ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgct	1680
aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa	1740
ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatgtt cctcaaaact	1860
agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatatatt aa	2112

<210> 51
 <211> 2136
 <212> DNA

<213> Pasteurella multocida

<400> 51
atgaacacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc 60
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aaatgccaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaatt 180
aaagaagaaa aagtcaatgt ttgcatagat ccgttagata ttgcaacaca actgttactt 240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca 360
aaagattttc ccaaagatct ggtttttagcg cttttacctg atcatgttaa tgattttaca 420
tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt 480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa 600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat 720
gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat 780
gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat 840
acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca 900
gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg 960
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gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac 1140
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gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag 1260
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gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg 1500
tctaaaccaa atggcggaat agcctcagca tcaaattgcag ccgtttcttt tgctaaaggt 1560
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ttaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgctc 1680
aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa 1740
ctcacaacgg ctatgattgc tcaccatttt agaatgttta cgattagagc ttggcattta 1800
acggatggat ttaacgaaaa tattgaaaac gccgtggatt atgacatgtt ccttaaactc 1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgcgt attacatggt 1920
 gataacacat ccattaagaa actcggcatt caaaagaaaa accattttgt tgtagtcaat 1980
 cagtcattaa atagacaagg catcaattat tataattatg acaaatttga tgatttagat 2040
 gaaagtagaa agtatatctt caataaaacc gctgaatatc aagaagaaat ggatatttta 2100
 aaagatctta aactcattca gaataaagat gcctaa 2136

<210> 52
 <211> 2091
 <212> DNA
 <213> *Pasteurella multocida*

<400> 52
 atgaatacat tatcacaagc aataaaagca tataacagca atgactatga attagcactc 60
 aaattatttg agaagtctgc tgaaacctac gggcgaaaaa tcgttgaatt ccaaattatc 120
 aatgtaaag aaaaactctc gaccaattct tatgtaagtg aagataaaaa aaacagtgtt 180
 tgcgatagct ctagatat cgcaacacag ctcttacttt ccaacgtaaa aaaattaact 240
 ctatccgaat cagaaaaaaaa cagtttaaaa aataaatgga aatctatcac tgggaaaaaa 300
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 agcttaggta taaagcctgt aaataagaat atcgggtcttt ctattattat tcctacattt 480
 aatcgtagcc gtatttttaga tataacgtta gcctgtttgg tcaatcagaa aacaaactac 540
 ccatttgaag tcgttggtgc agatgatggg agtaaggaaa acttacttac cattgtgcaa 600
 aaatacgaac aaaaacttga cataaagtat gtaagacaaa aagattatgg atatcaattg 660
 tgtgcagtca gaaacttagg ttacgtaca gcaaagtatg attttgtctc gattctagac 720
 tgcgatatgg caccacaaca attatgggtt cattcttatt ttacagaact attagaagac 780
 aatgatattg ttttaattgg acctagaaaa tatgtggata ctcataatat taccgcagaa 840
 caattcctta acgatccata tttaatagaa tctactactg aaaccgctac aaataacaat 900
 ctttcgatta catcaaaagg aaatatatcg ttggattgga gattagaaca tttcaaaaaa 960
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 ggcgaagatg tagaatttgg ttacagatta tttgccaaag gctgtttttt cagagtaatt 1140
 gacggcggaa tggcatacca tcaagaacca cctggtaaag aaaatgaaac agaccgcgaa 1200
 gctggtaaaa gtattacgct taaaattgtg aaagaaaagg taccttacat ctatagaaaa 1260
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gttgatctcg aggtttgtat ttgtaacgat ggttcaacag ataatacctt agaagtgatc 1440
 aataagcttt atggtaataa tcctagggta cgcacatgt ctaaaccaaa tggcggaata 1500
 gcctcagcat caaatgcagc cgtttctttt gctaaagggtt attacattgg gcagttagat 1560
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 ataacttatt ataattatga cgaatttgat gatttagatg aaagtagaaa gtatatatttc 2040
 aataaaaccg ctgaatatca agaagagatt gatatcttaa aagatattta a 2091

<210> 53
 <211> 29
 <212> DNA
 <213> artificial sequence

<220>
 <223> primer P1

<400> 53
 atgaacacat tatcacaagc aataaaagc 29

<210> 54
 <211> 27
 <212> DNA
 <213> artificial sequence

<220>
 <223> primer P2

<220>
 <221> misc_feature
 <222> (23)..(23)
 <223> Y = C/T

<400> 54
 gcgaatcttc tattggtaaa agytttc 27

<210> 55
 <211> 26
 <212> DNA
 <213> artificial sequence

<220>
 <223> primer P3

<400> 55

cttttaccaa tagaagattc gcatat

26

<210> 56
<211> 33
<212> DNA
<213> artificial sequence

<220>
<223> primer P4

<400> 56
gaagacgtct taggcatctt tattctgaat gag

33

<210> 57
<211> 43
<212> DNA
<213> artificial sequence

<220>
<223> primer P5

<400> 57
gggaattctg cagttaaata tctttaaga tatcaatctc ttc

43

<210> 58
<211> 33
<212> DNA
<213> artificial sequence

<220>
<223> sense primer

<220>
<221> misc_feature
<222> (9)..(9)
<223> inosine

<220>
<221> misc_feature
<222> (12)..(12)
<223> inosine

<220>
<221> misc_feature
<222> (18)..(18)
<223> inosine

<220>
<221> misc_feature
<222> (24)..(24)
<223> inosine

<220>
<221> misc_feature
<222> (27)..(27)
<223> inosine

<400> 58
garttybtnm rngarggnaa rgchytntay gay

33

<210> 59
<211> 39
<212> DNA
<213> artificial sequence

<220>
<223> antisense primer

<220>
<221> misc_feature
<222> (7)..(7)
<223> inosine

<220>
<221> misc_feature
<222> (10)..(10)
<223> inosine

<220>
<221> misc_feature
<222> (16)..(16)
<223> inosine

<220>
<221> misc_feature
<222> (22)..(22)
<223> inosine

<220>
<221> misc_feature
<222> (25)..(25)
<223> A, G, C or T

<400> 59
rcartancn ccrtanccra answnggrtt rttrtartg

39

<210> 60
<211> 30
<212> DNA
<213> artificial sequence

<220>
<223> 2nd antisense primer

<400> 60
tatatttaca gcagtatcat tttctaaagg

30

<210> 61
<211> 501
<212> PRT
<213> Pasteurella multocida

<400> 61

Met Ser Leu Phe Lys Arg Ala Thr Glu Leu Phe Lys Ser Gly Asn Tyr
1 5 10 15

Lys Asp Ala Leu Thr Leu Tyr Glu Asn Ile Ala Lys Ile Tyr Gly Ser
20 25 30

Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr
 35 40 45
 Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn
 50 55 60
 Glu Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser
 65 70 75 80
 Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser
 85 90 95
 Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile
 100 105 110
 Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val
 115 120 125
 Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala
 130 135 140
 Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly
 145 150 155 160
 Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile
 165 170 175
 Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His Glu Arg Ile Glu
 180 185 190
 Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg
 195 200 205
 Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val
 210 215 220
 Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg
 225 230 235 240
 Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser
 245 250 255
 Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg
 260 265 270
 Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp
 275 280 285

Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys
290 295 300

Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys
305 310 315 320

Ile His Asn Glu Arg Lys Phe Asn Glu Leu Lys Glu Ile Phe Ser Phe
325 330 335

Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu
340 345 350

Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser
355 360 365

Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys
370 375 380

Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe
385 390 395 400

Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys
405 410 415

Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu
420 425 430

Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile
435 440 445

Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys Lys Ile Asn Lys
450 455 460

Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser
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Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln
485 490 495

Lys Thr Phe Arg Lys
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ttctggagaa aacgaatttt cagtatcaat aaaagatcta tataacgaaa taagcaatag	240
tgaattaggg attacaaaag aaagactagg agccccct ctagtcagta ttataatgac	300
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caataactta gaagttatcg ttgtagatga ttatagcaca gataaaacat ttcagatcgc	420
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gaataaagat aatatagctg ttagatgtgc atattctaga ataaatctag aaacacaaaa	660
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aaaagtattt aatgaaattg gtttttttaa ctgcacaacc aaagcatcgg atgatgaatt	780
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gtattataac acaatgcgtg aagattcatt attttctgat atggttgagt gggtagatga	900
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tgacgcctta cctatatcaa aagaaatgag taagctcagc aaccctaaaa ttcctgttta	1080
tataaatata tgctcaatac cttcaagaat aaaacaactt caatacacta ttggagtact	1140
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tataaaaaaa ctagggaata aagcgaccgt tattaattgt caaaacaaaa atgagtctat	1260
tagagataat ggaaagttta ttctattaga aaaacttata aaggaaaata aagatggata	1320
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aaaaattaat aaatacaatg ataaagcagc aattggatta catgggtgta tattcccaag	1440
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20 25 30

Cys Leu Asn Glu Phe Glu Glu Ile Pro Glu Glu Leu Asp Gly Phe Ser
35 40 45

Lys Leu Asn Pro Val Ile Pro Asp Lys Asp Tyr Lys Asp Val Gly Lys
50 55 60

Phe Ile Phe Pro Cys Ala Lys Asn Asp Met Ile Val Leu Thr Asp Asp
65 70 75 80

Asp Ile Ile Tyr Pro Pro Asp Tyr Val Glu Lys Met Leu Asn Phe Tyr
85 90 95

Asn Ser Phe Ala Ile Phe Asn Cys Ile Val Gly Ile His Gly Cys Ile
100 105 110

Tyr Ile Asp Ala Phe Asp Gly Asp Gln Ser Lys Arg Lys Val Phe Ser
115 120 125

Phe Thr Gln Gly Leu Leu Arg Pro Arg Val Val Asn Gln Leu Gly Thr
130 135 140

Gly Thr Val Phe Leu Lys Ala Asp Gln Leu Pro Ser Leu Lys Tyr Met
145 150 155 160

Asp Gly Ser Gln Arg Phe Val Asp Val Arg Phe Ser Arg Tyr Met Leu
165 170 175

Glu Asn Glu Ile Gly Met Ile Cys Val Pro Arg Glu Lys Asn Trp Leu
180 185 190

Arg Glu Val Ser Ser Gly Ser Met Glu Gly Leu Trp Asn Thr Phe Thr
195 200 205

Lys Lys Trp Pro Leu Asp Ile Ile Lys Glu Thr Gln Ala Ile Ala Gly
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Tyr Ser Lys Leu Asn Leu Glu Leu Val Tyr Asn Val Glu Gly
225 230 235

<210> 64
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<212> PRT
<213> Escherichia coli

<400> 64

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Val Asp	Leu Gln His Lys Asn	Ser Pro Leu Lys Gly	Asn Asp Asn Leu
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Ile His	Lys Arg Ile Asn	Glu Tyr Asp Asn Val	Leu Glu Leu Ser Lys
	50	55	60
Asn Val	Ser Ala Gln Asn Ser	Gly Asn Glu Phe Ser Tyr	Leu Leu Gly
	65	70	75
Tyr Ala Asp	Ser Leu Arg Lys Val	Gly Met Leu Asp Thr Tyr	Ile Lys
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Ile Val	Cys Tyr Leu Thr Ile	Gln Ser Arg Tyr Phe Lys	Asn Gly Glu
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Arg Val	Lys Leu Phe Glu His	Ile Ser Asn Ala Leu Arg	Tyr Ser Arg
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Ser Asp	Phe Leu Ile Asn	Leu Ile Phe Glu Arg Tyr	Ile Glu Tyr Ile
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Asn His	Leu Lys Leu Ser	Pro Lys Gln Lys Asp	Phe Tyr Phe Cys Thr
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Lys Phe Ser	Lys Phe His Asp Tyr Thr	Lys Asn Gly Tyr Lys	Tyr Leu
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Ala Phe Asp	Asn Gln Ala Asp Ala	Gly Tyr Gly Leu Thr	Leu Leu Leu
	180	185	190
Asn Ala	Asn Asp Asp Met Gln	Asp Ser Tyr Asn Leu	Leu Pro Glu Gln
	195	200	205
Glu Leu	Phe Ile Cys Asn	Ala Val Ile Asp Asn	Met Asn Ile Tyr Arg
	210	215	220
Ser Gln	Phe Asn Lys Cys	Leu Arg Lys Tyr Asp	Leu Ser Glu Ile Thr
	225	230	235
Asp Ile Tyr	Pro Asn Lys Ile Ile	Leu Gln Gly Ile Lys	Phe Asp Lys
	245	250	255
Lys Lys Asn	Val Tyr Gly Lys Asp	Leu Val Ser Ile Ile	Met Ser Val

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 Phe Asn Ser Glu Asp Thr Ile Ala Tyr Ser Leu His Ser Leu Leu Asn
 275 280 285
 Gln Thr Tyr Glu Asn Ile Glu Ile Leu Val Cys Asp Asp Cys Ser Ser
 290 295 300
 Asp Lys Ser Leu Glu Ile Ile Lys Ser Ile Ala Tyr Ser Ser Ser Arg
 305 310 315 320
 Val Lys Val Tyr Ser Ser Arg Lys Asn Gln Gly Pro Tyr Asn Ile Arg
 325 330 335
 Asn Glu Leu Ile Lys Lys Ala His Gly Asn Phe Ile Thr Phe Gln Asp
 340 345 350
 Ala Asp Asp Leu Ser His Pro Glu Arg Ile Gln Arg Gln Val Glu Val
 355 360 365
 Leu Arg Asn Asn Lys Ala Val Ile Cys Met Ala Asn Trp Ile Arg Val
 370 375 380
 Ala Ser Asn Gly Lys Ile Gln Phe Phe Tyr Asp Asp Lys Ala Thr Arg
 385 390 395 400
 Met Ser Val Val Ser Ser Met Ile Lys Lys Asp Ile Phe Ala Thr Val
 405 410 415
 Gly Gly Tyr Arg Gln Ser Leu Ile Gly Ala Asp Thr Glu Phe Tyr Glu
 420 425 430
 Thr Val Ile Met Arg Tyr Gly Arg Glu Ser Ile Val Arg Leu Leu Gln
 435 440 445
 Pro Leu Ile Leu Gly Leu Trp Gly Asp Ser Gly Leu Thr Arg Asn Lys
 450 455 460
 Gly Thr Glu Ala Leu Pro Asp Gly Tyr Ile Ser Gln Ser Arg Arg Glu
 465 470 475 480
 Tyr Ser Asp Ile Ala Ala Arg Gln Arg Val Leu Gly Lys Ser Ile Val
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515

520

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 35 40 45

Pro Ser Pro Asp His Phe Trp Pro Arg Phe Pro Asp Ala Leu Arg Pro
 50 55 60

Phe Phe Pro Trp Asp Gln Leu Glu Asn Glu Asp Ser Ser Val His Ile
 65 70 75 80

Ser Pro Arg Gln Lys Arg Asp Ala Asn Ser Ser Ile Tyr Lys Gly Lys
 85 90 95

Lys Cys Arg Met Glu Ser Cys Phe Asp Phe Thr Leu Cys Lys Lys Asn
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Gly Phe Lys Val Tyr Val Tyr Pro Gln Gln Lys Gly Glu Lys Ile Ala
 115 120 125

Glu Ser Tyr Gln Asn Ile Leu Ala Ala Ile Glu Gly Ser Arg Phe Tyr
 130 135 140

Thr Ser Asp Pro Ser Gln Ala Cys Leu Phe Val Leu Ser Leu Asp Thr
 145 150 155 160

Leu Asp Arg Asp Gln Leu Ser Pro Gln Tyr Val His Asn Leu Arg Ser
 165 170 175

Lys Val Gln Ser Leu His Leu Trp Asn Asn Gly Arg Asn His Leu Ile
 180 185 190

Phe Asn Leu Tyr Ser Gly Thr Trp Pro Asp Tyr Thr Glu Asp Val Gly
 195 200 205

Phe Asp Ile Gly Gln Ala Met Leu Ala Lys Ala Ser Ile Ser Thr Glu
 210 215 220

Asn Phe Arg Pro Asn Phe Asp Val Ser Ile Pro Leu Phe Ser Lys Asp
225 230 235 240

His Pro Arg Thr Gly Gly Glu Arg Gly Phe Leu Lys Phe Asn Thr Ile
245 250 255

Pro Pro Leu Arg Lys Tyr Met Leu Val Phe Lys Gly Lys Arg Tyr Leu
260 265 270

Thr Gly Ile Gly Ser Asp Thr Arg Asn Ala Leu Tyr His Val His Asn
275 280 285

Gly Glu Asp Val Leu Leu Leu Thr Thr Cys Lys His Gly Lys Asp Trp
290 295 300

Gln Lys His Lys Asp Ser Arg Cys Asp Arg Asp Asn Thr Glu Tyr Glu
305 310 315 320

Lys Tyr Asp Tyr Arg Glu Met Leu His Asn Ala Thr Phe Cys Leu Val
325 330 335

Pro Arg Gly Arg Arg Leu Gly Ser Phe Arg Phe Leu Glu Ala Leu Gln
340 345 350

Ala Ala Cys Val Pro Val Met Leu Ser Asn Gly Trp Glu Leu Pro Phe
355 360 365

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370 375 380

Leu Leu Leu Gln Ile Pro Ser Thr Ile Arg Ser Ile His Gln Asp Lys
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Ile Leu Ala Leu Arg Gln Gln Thr Gln Phe Leu Trp Glu Ala Tyr Phe
405 410 415

Ser Ser Val Glu Lys Ile Val Leu Thr Thr Leu Glu Ile Ile Gln Asp
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Arg Ile Phe Lys His Ile Ser Arg Asn Ser Leu Ile Trp Asn Lys His
435 440 445

Pro Gly Gly Leu Phe Val Leu Pro Gln Tyr Ser Ser Tyr Leu Gly Asp
450 455 460

Phe Pro Tyr Tyr Tyr Ala Asn Leu Gly Leu Lys Pro Pro Ser Lys Phe
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Thr Ala Val Ile His Ala Val Thr Pro Leu Val Ser Gln Ser Gln Pro
485 490 495

Val Leu Lys Leu Leu Val Ala Ala Ala Lys Ser Gln Tyr Cys Ala Gln
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Pro Ala Arg Ser His Phe Trp Asp Asn Ser Lys Glu Arg Trp Gly Tyr
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Thr Ser Lys Trp Thr Asn Asp Tyr Ser Met Val Leu Thr Gly Ala Ala
610 615 620

Ile Tyr His Lys Tyr Tyr His Tyr Leu Tyr Ser His Tyr Leu Pro Ala
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Ser Leu Lys Asn Met Val Asp Gln Leu Ala Asn Cys Glu Asp Ile Leu
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Met Asn Phe Leu Val Ser Ala Val Thr Lys Leu Pro Pro Ile Lys Val
660 665 670

Thr Gln Lys Lys Gln Tyr Lys Glu Thr Met Met Gly Gln Thr Ser Arg
675 680 685

Ala Ser Arg Trp Ala Asp Pro Asp His Phe Ala Gln Arg Gln Ser Cys
690 695 700

Met Asn Thr Phe Ala Ser Trp Phe Gly Tyr Met Pro Leu Ile His Ser
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35 40 45

Ser Ile Glu Ser Ser Ser Asp Gly Gly Val Glu Lys Arg Ser Ile Arg
50 55 60

Glu Val Pro Val Val Arg Leu Pro Thr Asp Ser Pro Ile Pro Glu Arg
65 70 75 80

Gly Asp Leu Ser Cys Arg Met His Thr Cys Phe Asp Val Tyr Arg Cys
85 90 95

Gly Phe Asn Pro Lys Asn Lys Ile Lys Val Tyr Ile Tyr Pro Leu Lys
100 105 110

Lys Tyr Val Asp Asp Ala Gly Val Pro Val Ser Ser Ala Ile Ser Arg
115 120 125

Glu Tyr Asn Glu Leu Leu Thr Ala Ile Ser Asp Ser Asp Tyr Tyr Thr
130 135 140

Asp Asp Ile Asn Arg Ala Cys Leu Phe Val Pro Ser Ile Asp Val Leu
145 150 155 160

Asn Gln Asn Pro Leu Arg Ile Lys Glu Thr Ala Gln Ala Leu Ala Gln
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Leu Ser Arg Trp Asp Arg Gly Thr Asn His Leu Leu Phe Asn Met Leu
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Pro Gly Ala Pro Pro Asp Tyr Asn Thr Ala Leu Asp Val Pro Arg Asp
195 200 205

Arg Ala Leu Leu Ala Gly Gly Gly Phe Ser Thr Trp Thr Tyr Arg Gln
 210 215 220
 Gly Tyr Asp Val Ser Ile Pro Val Phe Ser Pro Leu Ser Ala Glu Met
 225 230 235 240
 Ala Leu Pro Glu Lys Ala Pro Gly Pro Arg Arg Tyr Phe Leu Leu Ser
 245 250 255
 Ser Gln Met Ala Ile His Pro Glu Tyr Arg Glu Glu Leu Glu Ala Leu
 260 265 270
 Gln Ala Lys His Gln Glu Ser Val Leu Val Leu Asp Lys Cys Thr Asn
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 290 295 300
 Val Phe Asp Tyr Pro Gln Val Leu Gln Glu Ala Thr Phe Cys Thr Val
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 325 330 335
 Ala Gly Cys Val Pro Val Val Ile Ala Asp Ser Tyr Ile Leu Pro Phe
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 Ser Glu Val Leu Asp Trp Lys Lys Ala Ser Val Val Val Pro Glu Glu
 355 360 365
 Lys Met Ser Asp Val Tyr Ser Ile Leu Gln Asn Ile Pro Gln Arg Gln
 370 375 380
 Ile Glu Glu Met Gln Arg Gln Ala Arg Trp Phe Trp Glu Ala Tyr Phe
 385 390 395 400
 Gln Ser Ile Lys Ala Ile Ala Leu Ala Thr Leu Gln Ile Ile Asn Asp
 405 410 415
 Arg Ile Tyr Pro Tyr Ala Ala Ile Ser Tyr Glu Glu Trp Asn Asp Pro
 420 425 430
 Pro Ala Val Lys Trp Ala Ser Val Ser Asn Pro Leu Phe Leu Pro Leu
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Arg Val Glu Ser Leu Phe Arg Val Ile Thr Glu Val Ser Lys Val Pro
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 Thr Ser Asp Glu Leu Gln Phe Gly Tyr Glu Val Trp Arg Glu Phe Pro
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 Asp Arg Leu Val Gly Tyr Pro Gly Arg Leu His Leu Trp Asp His Glu
 565 570 575
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 580 585 590
 Val Leu Thr Gly Ala Ala Phe Tyr His Lys Tyr Phe Asn Tyr Leu Tyr
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 Cys Thr Ala Ile Asp Gly Leu Ser Leu Asp Gln Thr His Met Val Glu
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 Arg Ser Glu Cys Ile Asn Lys Phe Ala Ser Val Phe Gly Thr Met Pro
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 20 25 30

Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Xaa Gly Xaa Tyr Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Gln Asp
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 each position may be any amino acid

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 each position may be any amino acid

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 20 25 30

Asp Tyr Xaa Xaa Xaa Met Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Asn Xaa
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Leu Gly Thr Gly Thr Val
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 tctcataata cagaaaaatt cattgaagcc tcaattaatt cactattatt gcaaacatac 360

aataacttag aagttatcgt tgtagatgat tatagcacag ataaaacatt tcagatcgca 420
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acatactttg cgaaaaatac aggaatttta aagtctaaag gagatattat tttctttcag 540
gatagcgatg atgtatgtca ccatgaaaga atcgaaagat gtgttaatgc attattatcg 600
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ctatgtaaga aaaacaatat actccaagtt tgtatatcac gaccatcgaa ttggctaaca 1680
gaagataaca aaaacactga gaccttattt catgaattcc aaaatagaga tgaaatacaa 1740
agtaaaactca ttatttcaaa caacccttgg ggatactcaa gtatatatcc attattaaat 1800
aataatgcta attattctga acttattccg tgtttatctt tttataacga gtaa 1854

<210> 70
<211> 617
<212> PRT
<213> Pasteurella multocida

<400> 70

Met Ser Leu Phe Lys Arg Ala Thr Glu Leu Phe Lys Ser Gly Asn Tyr
1 5 10 15

Lys Asp Ala Leu Thr Leu Tyr Glu Asn Ile Ala Lys Ile Tyr Gly Ser
20 25 30

Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr
35 40 45

Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn
50 55 60

Lys Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser
65 70 75 80

Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser
85 90 95

Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile
100 105 110

Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val
115 120 125

Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala
130 135 140

Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly
145 150 155 160

Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile
165 170 175

Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His Glu Arg Ile Glu
180 185 190

Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg
195 200 205

Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val
210 215 220

Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg
225 230 235 240

Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser
245 250 255

Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg
260 265 270

Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp
275 280 285

Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys
290 295 300

Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys
305 310 315 320

Ile His Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe
325 330 335

Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu
340 345 350

Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser
355 360 365

Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys
370 375 380

Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe
385 390 395 400

Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys
405 410 415

Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu
420 425 430

Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile
435 440 445

Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys Lys Ile Asn Lys
450 455 460

Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser
465 470 475 480

Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln
485 490 495

Lys Pro Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr
500 505 510

Val Ala Phe Arg Val Ser Ile Phe Asn Lys Phe Ser Leu Ser Asp Phe
515 520 525

Glu His Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys
530 535 540

Asn Asn Ile Leu Gln Val Cys Ile Ser Arg Pro Ser Asn Trp Leu Thr
 545 550 555 560

Glu Asp Asn Lys Asn Thr Glu Thr Leu Phe His Glu Phe Gln Asn Arg
 565 570 575

Asp Glu Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr
 580 585 590

Ser Ser Ile Tyr Pro Leu Leu Asn Asn Asn Ala Asn Tyr Ser Glu Leu
 595 600 605

Ile Pro Cys Leu Ser Phe Tyr Asn Glu
 610 615

<210> 71
 <211> 2112
 <212> DNA
 <213> Pasteurella multocida

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 aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaatt 180
 aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt 240
 tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
 aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca 360
 aaagattttc ccaaagatct ggttttagcg cttttacctg atcatgttaa tgattttaca 420
 tgggtacaaa agcgaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt 480
 tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
 gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa 600
 gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
 aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat 720
 gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat 780
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 gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg 960
 cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt 1020
 tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat 1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac 1140
 ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa 1200
 gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag 1260
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 ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat 1380
 agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca 1440
 gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg 1500
 tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt 1560
 tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt 1620
 ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc 1680
 aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa 1740
 ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta 1800
 actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatgtt cctcaaacctc 1860
 agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt 1920
 gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat 1980
 cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat 2040
 gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta 2100
 aaagatatatt aa 2112

<210> 72
 <211> 107
 <212> PRT
 <213> Pasteurella multocida

<400> 72

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
 1 5 10 15

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
 20 25 30

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
 35 40 45

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly
 50 55 60

Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr
 65 70 75 80

Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp
85 90 95

Val His Ser Tyr Val Ala Glu Leu Leu Glu Asp
100 105

<210> 73
<211> 105
<212> PRT
<213> Pasteurella multocida

<400> 73

Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys
1 5 10 15

Val Asp Ser Ala Leu Asn Gln Thr Thr Val Asp Leu Glu Val Cys Ile
20 25 30

Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val Ile Asn Lys Leu
35 40 45

Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys Pro Asn Gly Gly
50 55 60

Ile Ala Ser Ala Ser Asn Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr
65 70 75 80

Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu
85 90 95

Leu Cys Leu Lys Glu Phe Leu Lys Asp
100 105

<210> 74
<211> 771
<212> PRT
<213> Pasteurella multocida

<400> 74

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala
35 40 45

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
50 55 60

Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
65 70 75 80

Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
85 90 95

Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu
100 105 110

Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val
115 120 125

Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys
130 135 140

Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu
145 150 155 160

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
180 185 190

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly
210 215 220

Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr
225 230 235 240

Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp
245 250 255

Val His Ser Tyr Val Ala Glu Leu Leu Val Gln Lys Tyr Glu Gln Lys
260 265 270

Leu Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln Leu Cys
275 280 285

Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe Val Ser
290 295 300

Ile Leu Asp Cys Asp Met Ala Pro Gln Gln Leu Trp Val His Ser Tyr
305 310 315 320

Leu Thr Glu Leu Leu Glu Asp Asn Asp Ile Val Leu Ile Gly Pro Arg
325 330 335

Lys Tyr Val Asp Thr His Asn Ile Thr Ala Glu Gln Phe Leu Asn Asp
340 345 350

Pro Tyr Leu Ile Glu Ser Leu Pro Glu Thr Ala Thr Asn Asn Asn Pro
355 360 365

Ser Ile Thr Ser Lys Gly Asn Ile Ser Leu Asp Trp Arg Leu Glu His
370 375 380

Phe Lys Lys Thr Asp Asn Leu Arg Leu Cys Asp Ser Pro Phe Arg Tyr
385 390 395 400

Phe Ser Cys Gly Asn Val Ala Phe Ser Lys Glu Trp Leu Asn Lys Val
405 410 415

Gly Trp Phe Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu
420 425 430

Phe Gly Tyr Arg Leu Phe Ala Lys Gly Cys Phe Phe Arg Val Ile Asp
435 440 445

Gly Gly Met Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr
450 455 460

Asp Arg Glu Ala Gly Lys Ser Ile Thr Leu Lys Ile Val Lys Glu Lys
465 470 475 480

Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile
485 490 495

His Arg Ile Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala
500 505 510

Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val
515 520 525

Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu
530 535 540

Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met
545 550 555 560

Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn Ala Ala Val Ser
565 570 575

Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu
580 585 590

Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe Leu Lys Asp Lys
595 600 605

Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val Asn Pro Asp Gly
610 615 620

Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe Ser Arg Glu Lys
625 630 635 640

Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met Phe Thr Ile Arg
645 650 655

Ala Trp His Leu Thr Asp Gly Phe Asn Glu Asn Ile Glu Asn Ala Val
660 665 670

Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His
675 680 685

Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly Asp Asn Thr Ser
690 695 700

Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn
705 710 715 720

Gln Ser Leu Asn Arg Gln Gly Ile Asn Tyr Tyr Asn Tyr Asp Lys Phe
725 730 735

Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn Lys Thr Ala Glu
740 745 750

Tyr Gln Glu Glu Met Asp Ile Leu Lys Asp Leu Lys Leu Ile Gln Asn
755 760 765

Lys Asp Ala
770

<210> 75
<211> 696
<212> PRT
<213> Pasteurella multocida

<400> 75

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Glu Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Thr Tyr Gly Arg
 20 25 30
 Lys Ile Val Glu Phe Gln Ile Ile Lys Cys Lys Glu Lys Leu Ser Thr
 35 40 45
 Asn Ser Tyr Val Ser Glu Asp Lys Lys Asn Ser Val Cys Asp Ser Ser
 50 55 60
 Leu Asp Ile Ala Thr Gln Leu Leu Leu Ser Asn Val Lys Lys Leu Thr
 65 70 75 80
 Leu Ser Glu Ser Glu Lys Asn Ser Leu Lys Asn Lys Trp Lys Ser Ile
 85 90 95
 Thr Gly Lys Lys Ser Glu Asn Ala Glu Ile Arg Lys Val Glu Leu Val
 100 105 110
 Pro Lys Asp Phe Pro Lys Asp Leu Val Leu Ala Pro Leu Pro Asp His
 115 120 125
 Val Asn Asp Phe Thr Trp Tyr Lys Asn Arg Lys Lys Ser Leu Gly Ile
 130 135 140
 Lys Pro Val Asn Lys Asn Ile Gly Leu Ser Ile Ile Ile Pro Thr Phe
 145 150 155 160
 Asn Arg Ser Arg Ile Leu Asp Ile Thr Leu Ala Cys Leu Val Asn Gln
 165 170 175
 Lys Thr Asn Tyr Pro Phe Glu Val Val Val Ala Asp Asp Gly Ser Lys
 180 185 190
 Glu Asn Leu Leu Thr Ile Ile Arg Gln Tyr Glu Asn Lys Leu Asp Ile
 195 200 205
 Arg Tyr Val Arg Gln Lys Asp Asn Gly Phe Gln Ala Ser Ala Ala Arg
 210 215 220
 Asn Met Gly Leu Arg Leu Ala Lys Tyr Asp Phe Ile Gly Leu Leu Asp
 225 230 235 240
 Cys Asp Met Ala Pro Asn Pro Leu Trp Val His Ser Tyr Val Ala Glu
 245 250 255
 Leu Leu Glu Asp Asp Asp Leu Thr Ile Ile Gly Pro Arg Lys Tyr Ile
 260 265 270

Asp Thr Gln His Ile Asp Pro Lys Asp Phe Leu Asn Asn Ala Ser Leu
 275 280 285
 Leu Glu Ser Leu Pro Glu Val Lys Thr Asn Asn Ser Val Ala Ala Lys
 290 295 300
 Gly Glu Gly Thr Val Ser Leu Asp Trp Arg Leu Glu Gln Phe Glu Lys
 305 310 315 320
 Thr Glu Asn Leu Arg Leu Ser Asp Ser Pro Phe Arg Phe Phe Ala Ala
 325 330 335
 Gly Asn Val Ala Phe Ala Lys Lys Trp Leu Asn Lys Ser Gly Phe Phe
 340 345 350
 Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu Phe Gly Tyr
 355 360 365
 Arg Leu Phe Arg Tyr Gly Ser Phe Phe Lys Thr Ile Asp Gly Ile Met
 370 375 380
 Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr Asp Arg Glu
 385 390 395 400
 Ala Gly Lys Asn Ile Thr Leu Asp Ile Met Arg Glu Lys Val Pro Tyr
 405 410 415
 Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile Asn Arg Val
 420 425 430
 Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr Ile
 435 440 445
 Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val Asp Leu Glu
 450 455 460
 Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val Ile
 465 470 475 480
 Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys Pro
 485 490 495
 Asn Gly Gly Ile Ala Ser Ala Ser Asn Ala Ala Val Ser Phe Ala Lys
 500 505 510
 Gly Tyr Tyr Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu Glu Pro Asp
 515 520 525

Ala Val Glu Leu Cys Leu Lys Glu Phe Leu Lys Asp Lys Thr Leu Ala
530 535 540

Cys Val Tyr Thr Thr Asn Arg Asn Val Asn Pro Asp Gly Ser Leu Ile
545 550 555 560

Ala Asn Gly Tyr Asn Trp Pro Glu Phe Ser Arg Glu Lys Leu Thr Thr
565 570 575

Ala Met Ile Ala His His Phe Arg Met Phe Thr Ile Arg Ala Trp His
580 585 590

Leu Thr Asp Gly Phe Asn Glu Lys Ile Glu Asn Ala Val Asp Tyr Asp
595 600 605

Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His Leu Asn Lys
610 615 620

Ile Cys Tyr Asn Arg Val Leu His Gly Asp Asn Thr Ser Ile Lys Lys
625 630 635 640

Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn Gln Ser Leu
645 650 655

Asn Arg Gln Gly Ile Thr Tyr Tyr Asn Tyr Asp Glu Phe Asp Asp Leu
660 665 670

Asp Glu Ser Arg Lys Tyr Ile Phe Asn Lys Thr Ala Glu Tyr Gln Glu
675 680 685

Glu Ile Asp Ile Leu Lys Asp Ile
690 695

<210> 76
<211> 711
<212> PRT
<213> Pasteurella multocida

<400> 76

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala
35 40 45

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
 50 55 60
 Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
 65 70 75 80
 Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
 85 90 95
 Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu
 100 105 110
 Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val
 115 120 125
 Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys
 130 135 140
 Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu
 145 150 155 160
 Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
 165 170 175
 Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
 180 185 190
 Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
 195 200 205
 Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Tyr Gly
 210 215 220
 Tyr Gln Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr
 225 230 235 240
 Asp Phe Val Ser Ile Leu Asp Cys Asp Met Ala Pro Gln Gln Leu Trp
 245 250 255
 Val His Ser Tyr Leu Thr Glu Leu Leu Glu Asp Asn Asp Ile Val Leu
 260 265 270
 Ile Gly Pro Arg Lys Tyr Val Asp Thr His Asn Ile Thr Ala Glu Gln
 275 280 285
 Phe Leu Asn Asp Pro Tyr Leu Ile Glu Ser Leu Pro Glu Thr Ala Thr
 290 295 300

Asn Asn Asn Pro Ser Ile Thr Ser Lys Gly Asn Ile Ser Leu Asp Trp
 305 310 315 320
 Arg Leu Glu His Phe Lys Lys Thr Asp Asn Leu Arg Leu Cys Asp Ser
 325 330 335
 Pro Phe Arg Tyr Phe Ser Cys Gly Asn Val Ala Phe Ser Lys Glu Trp
 340 345 350
 Leu Asn Lys Val Gly Trp Phe Asp Glu Glu Phe Asn His Trp Gly Gly
 355 360 365
 Glu Asp Val Glu Phe Gly Tyr Arg Leu Phe Ala Lys Gly Cys Phe Phe
 370 375 380
 Arg Val Ile Asp Gly Gly Met Ala Tyr His Gln Glu Pro Pro Gly Lys
 385 390 395 400
 Glu Asn Glu Thr Asp Arg Glu Ala Gly Lys Ser Ile Thr Leu Lys Ile
 405 410 415
 Val Lys Glu Lys Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu
 420 425 430
 Asp Ser His Ile His Arg Ile Pro Leu Val Ser Ile Tyr Ile Pro Ala
 435 440 445
 Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn
 450 455 460
 Gln Thr Val Val Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr
 465 470 475 480
 Asp Asn Thr Leu Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg
 485 490 495
 Val Arg Ile Met Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn
 500 505 510
 Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser
 515 520 525
 Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe
 530 535 540
 Leu Lys Asp Lys Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val
 545 550 555 560

Asn Pro Asp Gly Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe
565 570 575

Ser Arg Glu Lys Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met
580 585 590

Phe Thr Ile Arg Ala Trp His Leu Thr Asp Gly Phe Asn Glu Asn Ile
595 600 605

Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly
610 615 620

Lys Phe Lys His Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly
625 630 635 640

Asp Asn Thr Ser Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe
645 650 655

Val Val Val Asn Gln Ser Leu Asn Arg Gln Gly Ile Asn Tyr Tyr Asn
660 665 670

Tyr Asp Lys Phe Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn
675 680 685

Lys Thr Ala Glu Tyr Gln Glu Glu Met Asp Ile Leu Lys Asp Leu Lys
690 695 700

Leu Ile Gln Asn Lys Asp Ala
705 710

<210> 77
<211> 696
<212> PRT
<213> Pasteurella multocida

<400> 77

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Glu Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Thr Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Ile Lys Cys Lys Glu Lys Leu Ser Thr
35 40 45

Asn Ser Tyr Val Ser Glu Asp Lys Lys Asn Ser Val Cys Asp Ser Ser
50 55 60

Leu Asp Ile Ala Thr Gln Leu Leu Leu Ser Asn Val Lys Lys Leu Thr
Page 103

65		70		75		80
Leu Ser Glu Ser	Glu Lys Asn Ser	Leu Lys Asn Lys Trp Lys	Ser Ile			
	85	90	95			
Thr Gly Lys Lys	Ser Glu Asn Ala	Glu Ile Arg Lys Val	Glu Leu Val			
	100	105	110			
Pro Lys Asp Phe	Pro Lys Asp	Leu Val Leu Ala Pro	Leu Pro Asp His			
	115	120	125			
Val Asn Asp Phe	Thr Trp Tyr	Lys Asn Arg Lys Lys	Ser Leu Gly Ile			
	130	135	140			
Lys Pro Val Asn	Lys Asn Ile Gly	Leu Ser Ile Ile Ile	Pro Thr Phe			
	145	150	155	160		
Asn Arg Ser Arg	Ile Leu Asp Ile	Thr Leu Ala Cys	Leu Val Asn Gln			
	165	170	175			
Lys Thr Asn Tyr	Pro Phe Glu Val	Val Val Ala Asp Asp	Gly Ser Lys			
	180	185	190			
Glu Asn Leu Leu	Thr Ile Val Gln	Lys Tyr Glu Gln	Lys Leu Asp Ile			
	195	200	205			
Lys Tyr Val Arg	Gln Lys Asp Asn	Gly Phe Gln Ala	Ser Ala Ala Arg			
	210	215	220			
Asn Met Gly Leu	Arg Leu Ala Lys	Tyr Asp Phe Ile	Gly Leu Leu Asp			
	225	230	235	240		
Cys Asp Met Ala	Pro Asn Pro Leu	Trp Val His Ser Tyr	Val Ala Glu			
	245	250	255			
Leu Leu Glu Asp	Asp Asp Leu Thr	Ile Ile Gly Pro Arg	Lys Tyr Ile			
	260	265	270			
Asp Thr Gln His	Ile Asp Pro Lys	Asp Phe Leu Asn	Asn Ala Ser Leu			
	275	280	285			
Leu Glu Ser Leu	Pro Glu Val Lys	Thr Asn Asn Ser	Val Ala Ala Lys			
	290	295	300			
Gly Glu Gly Thr	Val Ser Leu Asp	Trp Arg Leu Glu	Gln Phe Glu Lys			
	305	310	315	320		
Thr Glu Asn Leu	Arg Leu Ser Asp	Ser Pro Phe Arg	Phe Phe Ala Ala			

325										330					335				
Gly	Asn	Val	Ala	Phe	Ala	Lys	Lys	Trp	Leu	Asn	Lys	Ser	Gly	Phe	Phe				
			340					345					350						
Asp	Glu	Glu	Phe	Asn	His	Trp	Gly	Gly	Glu	Asp	Val	Glu	Phe	Gly	Tyr				
		355					360					365							
Arg	Leu	Phe	Arg	Tyr	Gly	Ser	Phe	Phe	Lys	Thr	Ile	Asp	Gly	Ile	Met				
	370					375					380								
Ala	Tyr	His	Gln	Glu	Pro	Pro	Gly	Lys	Glu	Asn	Glu	Thr	Asp	Arg	Glu				
	385				390					395					400				
Ala	Gly	Lys	Asn	Ile	Thr	Leu	Asp	Ile	Met	Arg	Glu	Lys	Val	Pro	Tyr				
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Ile	Tyr	Arg	Lys	Leu	Leu	Pro	Ile	Glu	Asp	Ser	His	Ile	Asn	Arg	Val				
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Pro	Leu	Val	Ser	Ile	Tyr	Ile	Pro	Ala	Tyr	Asn	Cys	Ala	Asn	Tyr	Ile				
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Gln	Arg	Cys	Val	Asp	Ser	Ala	Leu	Asn	Gln	Thr	Val	Val	Asp	Leu	Glu				
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Val	Cys	Ile	Cys	Asn	Asp	Gly	Ser	Thr	Asp	Asn	Thr	Leu	Glu	Val	Ile				
	465				470					475					480				
Asn	Lys	Leu	Tyr	Gly	Asn	Asn	Pro	Arg	Val	Arg	Ile	Met	Ser	Lys	Pro				
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Gly	Tyr	Tyr	Ile	Gly	Gln	Leu	Asp	Ser	Asp	Asp	Tyr	Leu	Glu	Pro	Asp				
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Cys	Val	Tyr	Thr	Thr	Asn	Arg	Asn	Val	Asn	Pro	Asp	Gly	Ser	Leu	Ile				
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 595 600 605
 Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His Leu Asn Lys
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 625 630 635 640
 Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn Gln Ser Leu
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 Asn Arg Gln Gly Ile Thr Tyr Tyr Asn Tyr Asp Glu Phe Asp Asp Leu
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 Glu Ile Asp Ile Leu Lys Asp Ile
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 Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr Asp Phe
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 Ile Gly Leu Leu Asp Cys Asp Met
 35 40

<210> 79
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 <213> Pasteurella multocida
 <400> 79

Gln Lys Leu Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln
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 Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe
 20 25 30

Val Ser Ile Leu Asp Cys Asp Met
35 40

<210> 80
<211> 40
<212> PRT
<213> Meleagris gallopavo

<400> 80

Glu Lys Leu Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln
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Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe
20 25 30

Val Ser Ile Leu Asp Cys Asp Met
35 40

<210> 81
<211> 36
<212> PRT
<213> Goose

<400> 81

Val Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln Leu Cys
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Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe Val Ser
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Ile Leu Asp Cys
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<210> 82
<211> 33
<212> PRT
<213> sea lion

<400> 82

Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln Leu Cys Ala Val Arg
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Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe Val Ser Ile Leu Asp
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<400> 83

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Val Arg Asn Xaa Gly Leu Arg Thr Ala Lys Tyr Asp Phe Xaa Ser Ile
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Leu Asp Cys
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<400> 84

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Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg
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Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala
35 40 45

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
50 55 60

Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
65 70 75 80

Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
Page 108

85										90					95				
Lys	Asn	Lys	Trp	Lys	Leu	Leu	Thr	Glu	Lys	Lys	Ser	Glu	Asn	Ala	Glu				
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Val	Arg	Ala	Val	Ala	Leu	Val	Pro	Lys	Asp	Phe	Pro	Lys	Asp	Leu	Val				
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Leu	Ala	Pro	Leu	Pro	Asp	His	Val	Asn	Asp	Phe	Thr	Trp	Tyr	Lys	Lys				
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Arg	Lys	Lys	Arg	Leu	Gly	Ile	Lys	Pro	Glu	His	Gln	His	Val	Gly	Leu				
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Ser	Ile	Ile	Val	Thr	Thr	Phe	Asn	Arg	Pro	Ala	Ile	Leu	Ser	Ile	Thr				
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Leu	Ala	Cys	Leu	Val	Asn	Gln	Lys	Thr	His	Tyr	Pro	Phe	Glu	Val	Ile				
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Val	Thr	Asp	Asp	Gly	Ser	Gln	Glu	Asp	Leu	Ser	Pro	Ile	Ile	Arg	Gln				
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Tyr	Glu	Asn	Lys	Leu	Asp	Ile	Arg	Tyr	Val	Arg	Gln	Lys	Asp	Tyr	Gly				
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Tyr	Gln	Leu	Cys	Ala	Val	Arg	Asn	Leu	Gly	Leu	Arg	Thr	Ala	Lys	Tyr				
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Asp	Phe	Val	Ser	Ile	Leu	Asp	Cys	Asp	Met	Ala	Pro	Gln	Gln	Leu	Trp				
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Val	His	Ser	Tyr	Leu	Thr	Glu	Leu	Leu	Glu	Asp	Asp	Asp	Leu	Thr	Ile				
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Ile	Gly	Pro	Arg	Lys	Tyr	Ile	Asp	Thr	Gln	His	Ile	Asp	Pro	Lys	Asp				
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Phe	Leu	Asn	Asn	Ala	Ser	Leu	Leu	Glu	Ser	Leu	Pro	Glu	Val	Lys	Thr				
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Asn	Asn	Ser	Val	Ala	Ala	Lys	Gly	Glu	Gly	Thr	Val	Ser	Leu	Asp	Trp				
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Arg	Leu	Glu	Gln	Phe	Glu	Lys	Thr	Glu	Asn	Leu	Arg	Leu	Ser	Asp	Ser				
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Pro Phe Arg Phe Phe Ala Ala Gly Asn Val Ala Phe Ala Lys Lys Trp
Page 109

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Leu	Asn	Lys	Ser	Gly	Phe	Phe
		355				Asp
						360
						Glu
						Glu
						Phe
						Asn
						His
						365
						Trp
						Gly
						Gly
Glu	Asp	Val	Glu	Phe	Gly	Tyr
	370					375
						Arg
						Leu
						Phe
						Arg
						Tyr
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						Ser
						Phe
						Phe
Lys	Thr	Ile	Asp	Gly	Ile	Met
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						Tyr
						His
						Gln
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						Pro
						Pro
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						Lys
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						Lys
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						Leu
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						Pro
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						Asn
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						Asn
						Lys
						Leu
						Tyr
						Gly
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						Asn
						Asn
						Pro
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						Arg
Val	Arg	Ile	Met	Ser	Lys	Pro
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						505
						Gly
						Ile
						Ala
						Ser
						Ala
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						Ser
						Asn
Ala	Ala	Val	Ser	Phe	Ala	Lys
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						Tyr
						Tyr
						Ile
						Gly
						Gln
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						Leu
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						Val
						Glu
						Leu
						Cys
						540
						Leu
						Lys
						Glu
						Phe
Leu	Lys	Asp	Lys	Thr	Leu	Ala
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						Cys
						Val
						Tyr
						Thr
						555
						Thr
						Asn
						Arg
						Asn
						Val
						560
Asn	Pro	Asp	Gly	Ser	Leu	Ile
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						Ala
						Asn
						Gly
						570
						Tyr
						Asn
						Trp
						Pro
						Glu
						575
						Phe
Ser	Arg	Glu	Lys	Leu	Thr	Thr
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						Ala
						Met
						585
						Ile
						Ala
						His
						His
						Phe
						590
						Arg
						Met
Phe	Thr	Ile	Arg	Ala	Trp	His
						Leu
						Thr
						Asp
						Gly
						Phe
						Asn
						Glu
						Lys
						Ile

595 600 605
 Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly
 610 615 620
 Lys Phe Lys His Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly
 625 630 635 640
 Asp Asn Thr Ser Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe
 645 650 655
 Val Val Val Asn Gln Ser Leu Asn Arg Gln Gly Ile Thr Tyr Tyr Asn
 660 665 670
 Tyr Asp Glu Phe Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn
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 690 695 700

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<400> 85

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 Asn Ser Tyr Val Ser Glu Asp Lys Lys Asn Ser Val Cys Asp Ser Ser
 50 55 60
 Leu Asp Ile Ala Thr Gln Leu Leu Leu Ser Asn Val Lys Lys Leu Thr
 65 70 75 80
 Leu Ser Glu Ser Glu Lys Asn Ser Leu Lys Asn Lys Trp Lys Ser Ile
 85 90 95
 Thr Gly Lys Lys Ser Glu Asn Ala Glu Ile Arg Lys Val Glu Leu Val
 100 105 110
 Pro Lys Asp Phe Pro Lys Asp Leu Val Leu Ala Pro Leu Pro Asp His
 115 120 125

Val Asn Asp Phe Thr Trp Tyr Lys Asn Arg Lys Lys Ser Leu Gly Ile
130 135 140
Lys Pro Val Asn Lys Asn Ile Gly Leu Ser Ile Ile Ile Pro Thr Phe
145 150 155 160
Asn Arg Ser Arg Ile Leu Asp Ile Thr Leu Ala Cys Leu Val Asn Gln
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180 185 190
Glu Asn Leu Leu Thr Ile Val Gln Lys Tyr Glu Gln Lys Leu Asp Ile
195 200 205
Lys Tyr Val Arg Gln Lys Asp Asn Gly Phe Gln Ala Ser Ala Ala Arg
210 215 220
Asn Met Gly Leu Arg Leu Ala Lys Tyr Asp Phe Ile Gly Leu Leu Asp
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Cys Asp Met Ala Pro Asn Pro Leu Trp Val His Ser Tyr Val Ala Glu
245 250 255
Leu Leu Leu Glu Asp Asn Asp Ile Val Leu Ile Gly Pro Arg Lys Tyr
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Val Asp Thr His Asn Ile Thr Ala Glu Gln Phe Leu Asn Asp Pro Tyr
275 280 285
Leu Ile Glu Ser Leu Pro Glu Thr Ala Thr Asn Asn Asn Pro Ser Ile
290 295 300
Thr Ser Lys Gly Asn Ile Ser Leu Asp Trp Arg Leu Glu His Phe Lys
305 310 315 320
Lys Thr Asp Asn Leu Arg Leu Cys Asp Ser Pro Phe Arg Tyr Phe Ser
325 330 335
Cys Gly Asn Val Ala Phe Ser Lys Glu Trp Leu Asn Lys Val Gly Trp
340 345 350
Phe Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu Phe Gly
355 360 365
Tyr Arg Leu Phe Ala Lys Gly Cys Phe Phe Arg Val Ile Asp Gly Gly
370 375 380

Met Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr Asp Arg
385 390 395 400

Glu Ala Gly Lys Ser Ile Thr Leu Lys Ile Val Lys Glu Lys Val Pro
405 410 415

Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile His Arg
420 425 430

Ile Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr
435 440 445

Ile Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val Asp Leu
450 455 460

Glu Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val
465 470 475 480

Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys
485 490 495

Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn Ala Ala Val Ser Phe Ala
500 505 510

Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu Glu Pro
515 520 525

Asp Ala Val Glu Leu Cys Leu Lys Glu Phe Leu Lys Asp Lys Thr Leu
530 535 540

Ala Cys Val Tyr Thr Thr Asn Arg Asn Val Asn Pro Asp Gly Ser Leu
545 550 555 560

Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe Ser Arg Glu Lys Leu Thr
565 570 575

Thr Ala Met Ile Ala His His Phe Arg Met Phe Thr Ile Arg Ala Trp
580 585 590

His Leu Thr Asp Gly Phe Asn Glu Asn Ile Glu Asn Ala Val Asp Tyr
595 600 605

Asp Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His Leu Asn
610 615 620

Lys Ile Cys Tyr Asn Arg Val Leu His Gly Asp Asn Thr Ser Ile Lys
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Lys Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn Gln Ser
645 650 655

Leu Asn Arg Gln Gly Ile Asn Tyr Tyr Asn Tyr Asp Lys Phe Asp Asp
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Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn Lys Thr Ala Glu Tyr Gln
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Glu Glu Met Asp Ile Leu Lys Asp Leu Lys Leu Ile Gln Asn Lys Asp
690 695 700

Ala
705